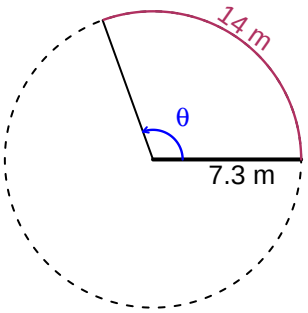
Name: Date:

Trig Final (Solution v34)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 14 meters. The radius is 7.3 meters. What is the angle measure in radians?

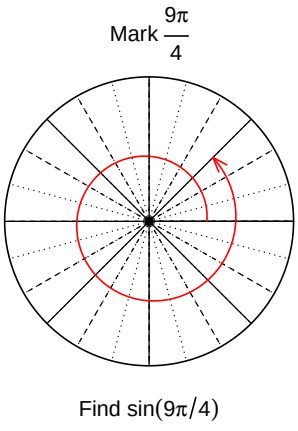


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

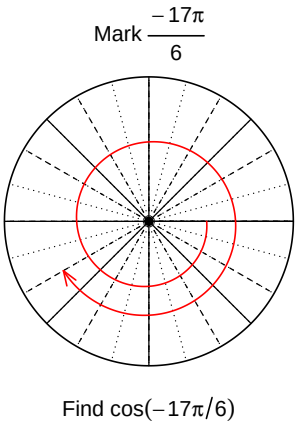
$\theta = 1.918$ radians.

Question 2

Consider angles $\frac{9\pi}{4}$ and $\frac{-17\pi}{6}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{9\pi}{4}\right)$ and $\cos\left(\frac{-17\pi}{6}\right)$ by using a unit circle (provided separately).



Find $\sin(9\pi/4)$



Find $\cos(-17\pi/6)$

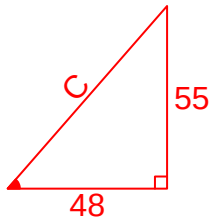
$\sin(9\pi/4) = \frac{\sqrt{2}}{2}$

$\cos(-17\pi/6) = \frac{-\sqrt{3}}{2}$

Question 3

If $\tan(\theta) = \frac{-55}{48}$, and θ is in quadrant IV, determine an exact value for $\cos(\theta)$.

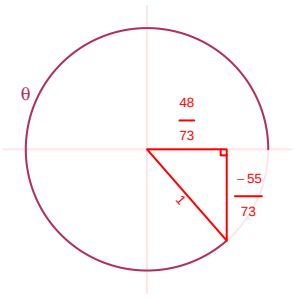
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$48^2 + 55^2 = C^2$$
$$C = \sqrt{48^2 + 55^2}$$
$$C = 73$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\cos(\theta) = \frac{48}{73}$$

Question 4

A mass-spring system oscillates vertically with an amplitude of 5.96 meters, a midline at $y = -8.51$ meters, and a frequency of 4 Hz. At $t = 0$, the mass is at the maximum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 5.96\cos(2\pi 4t) - 8.51$$

or

$$y = 5.96\cos(8\pi t) - 8.51$$

or

$$y = 5.96\cos(25.13t) - 8.51$$